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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/807,871  
Filing Date: March 24, 2004  
Appellant(s): SIMMEN, DAVID E.

Gates & Cooper LLP  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 03/26/07 appealing from the Office action  
mailed 10/02/06.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The following are the related appeals, interferences, and judicial proceedings known to the examiner, which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal:

09/669,556

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

6496819

Bello

12-2002

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Double Patenting***

Claims 1-33 stand provisionally rejected on the ground of nonstatutory double patenting over claims 1, 3-30 of copending Application No. 09/669556. This is a provisional double patenting rejection since the conflicting claims have not yet been patented.

The subject matter claimed in the instant application is fully disclosed in the referenced copending application and would be covered by any patent granted on that copending application since the referenced copending application and the instant application are claiming common subject matter, as follows: using statistics on one or more expressions of one or more pre-defined queries to determine an optimal query execution plan for the query, generating cardinality estimates for one or more query execution plans for the query using statistics of one or more automatic summary tables that vertically overlap the query and using the generated cardinality estimates to determine an optimal query execution plan for the query.

Furthermore, there is no apparent reason why applicant would be prevented from presenting claims corresponding to those of the instant application in the other copending application. See *In re Schneller*, 397 F.2d 350, 158 USPQ 210 (CCPA 1968). See also MPEP § 804.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2-5, 12-17, 23-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Zaharioudakis et al. (US 20030088558) (hereafter Zaharioudakis).

Regarding claims 1, 12 and 23, Zaharioudakis discloses: a method, an apparatus, an article of manufacture for optimizing execution of a query that accesses data stored on a data store connected to a computer comprising:

using statistics on one or more expressions of one or more pre-defined queries to determine an optimal query execution plan for the query (0041-0043, Zaharioudakis);

executing the optimal query execution plan for the query in order to access the data stored on the data store connected to a computer and then output the accessed data. (paragraphs 0041, 0043, Zaharioudakis).

Regarding claims 2, 13 and 24, all the limitations of these claims have been noted in the rejection of claims 1, 12 and 23 above, respectively. In addition, Zaharioudakis discloses: wherein each of the pre-defined queries is associated with an automatic summary table, materialized view or a view (0043, Zaharioudakis).

Regarding claims 3, 14 and 25, all the limitations of these claims have been noted in the rejection of claims 1, 12 and 23 above, respectively. In addition, Zaharioudakis disclose: further comprising: generating cardinality estimates for one or more query execution plans for the query using the statistics of one or more of the pre-defined queries that vertically overlap the query (0043, Zaharioudakis); and using the generated cardinality estimates to determine an optimal query execution plan for the query 0043, Zaharioudakis).

Regarding claims 4, 15 and 26, all the limitations of these claims have been noted in the rejection of claims 3, 14 and 25 above, respectively. In addition, Zaharioudakis discloses: wherein the statistics are used to improve a combined selectivity estimate of one or more predicates of the query (0041, Zaharioudakis).

Regarding claims 5, 16 and 27, all the limitations of these claims have been noted in the rejection of claims 4, 15 and 26 above, respectively. In addition, Zaharioudakis discloses: wherein the predicates are applied by one or more of the pre-defined queries (0048, Zaharioudakis).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-11, 17-22, and 28-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zaharioudakis et al. (US 20030088558) (Zaharioudakis) in view of Bello et al. (US 6496819) (Bello).

Regarding claims 6, 17 and 28, all the limitations of these claims have been noted in the rejection of claims 5, 16 and 27 above, respectively. However, Zaharioudakis didn't disclose: wherein the selectivity estimate comprises a ratio of a cardinality of the pre-defined query to a product of cardinalities of base tables referenced in the pre-defined query and the query. On the other hand, Bello discloses: wherein the selectivity estimate comprises a ratio of a cardinality of the pre-defined query to a product of cardinalities of base tables referenced in the pre-defined query and the query (col. 10, lines 45-67, Bello). Thus, at the time invention was made, it would have been obvious to a person of ordinary skill in the art to include the selectivity estimate comprises a ratio of a cardinality of the pre-defined query to a product of cardinalities of base tables referenced in the pre-defined query and the query in the system of Zaharioudakis as taught by Bello. The motivation being to enable the query reduction factor to estimates how useful it will be to access the materialized view to process the received query (col. 10, lines 42-45, Bello).

Regarding claims 7, 18 and 29, all the limitations of these claims have been noted in the rejection of claims 4, 15 and 26 above, respectively. However,

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Zaharioudakis didn't disclose: wherein zero or more predicates of the query are applied by one of the pre-defined queries and wherein the remaining predicates are eligible to be applied on the pre-defined query. On the other hand, wherein zero or more predicates of the query are applied by one of the pre-defined queries and wherein the remaining predicates are eligible to be applied on the pre-defined query (col. 10, lines 20-45, Bello). Thus, at the time invention was made, it would have been obvious to a person of ordinary skill in the art to include wherein zero or more predicates of the query are applied by one of the pre-defined queries and wherein the remaining predicates are eligible to be applied on the pre-defined query in the system of Zaharioudakis as taught by Bello. The motivation being to enable the system determines whether the materialized view is actually eligible to be used in rewrite of the received query to reduce the execution cost of the query.

Regarding claims 8, 19 and 30, all the limitations of these claims have been noted in the rejection of claims 7, 18 and 29 above, respectively. In addition, Zaharioudakis/Bello discloses: wherein a predicate is eligible to be applied on the pre-defined query if it can be evaluated using the output columns and expressions of the pre-defined query (col. 11, lines 30-55, Bello).

Regarding claims 9, 20 and 31, all the limitations of these claims have been noted in the rejection of claims 8, 19 and 30 above, respectively. In addition, Zaharioudakis/Bello discloses: further comprising determining a subpredicate combined selectivity estimate of the unapplied eligible predicates using column distribution statistics of the pre-defined query (col. 10, lines 30-36, Bello).



Regarding claims 10, 21 and 32, all the limitations of these claims have been noted in the rejection of claims 9, 20 and 31 above, respectively. In addition, Zaharioudakis/Bello discloses: wherein a cardinality ratio comprises a ratio of a cardinality of the pre-defined query to a product of cardinalities of base tables referenced in the pre-defined query and the query (col. 10, lines 37-56, Bello).

Regarding claims 11, 22 and 33, all the limitations of these claims have been noted in the rejection of claims 10, 21 and 32 above, respectively. In addition, Zaharioudakis/Bello discloses: wherein the selectivity estimate comprises a product of the subpredicate combined selectivity estimate and the cardinality ratio (col. 11, lines 55 to col. 12, lines 41, Bello).

## **(10) Response to Argument**

### **The Applicant's invention**

A method, apparatus and an article manufacture of optimizing execution of a query that accesses data stored on a data store connected to a computer.

Some of the definitions from Microsoft computer dictionary that the Examiner relied upon:

Cardinality: According to Microsoft Computer dictionary " In database, cardinal number that indicates how may items that are in a set or group (considered as a property of that grouping."

Therefore, Examiner interprets that cardinality as the size of the table, the number of distinct values in a particular column, etc.

Applicant argue that Zaharioudakis is not a prior art preference because Zahazioudakis has a November 5, 2002 filing date, which is more than two years after the September 26, 2000 filing date of the present application, and which is more than three years after the December 22, 1999 priority date of the present application. Although Zahazioudakis is a continuation-m-part to Utility Application Serial No.09/502,821, filed on February 11, 2000, which claims priority to Provisional Application Serial No. 60/135,133, filed on May 20, 1999, at least some of the specific portions of Zaharioudakis referred to in the rejections of the Office Action are only entitled to the November 5, 2002 filing date, because these specific portions of Zahatioudakis cannot be found in any of the prior patents. Note, for example, that the rejections of independent claims 1, 11 mad 21 refer to the following portions of Zaharioudakis: paragraphs [0031], [0041] and [0043]. However, Applicant's attorney submits that paragraph [0043] of Zahazioudakis cannot be found in any of the prior patents, paragraph [0043] of Zaharioudakis is not entitled to an effective date earlier than the November 5, 2002 filing date, and thus paragraph [0043] of Zaharioudakis cannot be cited against Applicant's claims. In response, the provisional

Prior art provisional serial number 60/135133, filed on May 20, 1999 provided all the portions of Zaharioudakis as cited in the rejection as following:

Zaharioudakis discloses: a method, an apparatus, an article of manufacture for optimizing execution of a query that accesses data stored on a data store connected to a computer comprising:

using statistics on one or more expressions of one or more pre-defined queries to determine an optimal query execution plan for the query (system held statistics on the data to be access as the size of the table, the number of distinct values in particular column, page 9, lines 20-24 and matching between query and AST, the query can be optimized by re-writing it to use the AST, page 15, lines 14 to page 16, lines 17) or (system held statistics on the data to be accessed the size of the table, the number of distinct values in a particular column, etc.), to choose what it considers to be the most efficient access path for the query. The load module 310 and application plan 314 are then executed together at step 316. (paragraph 0041, lines 25-29) and the purpose of the optimization technique presented here is to take advantage of existing ASTs by employing a matching algorithm that determines whether the content of an AST overlaps with the content of an SQL query, and compensates for the non overlapping parts, when such an overlap exists, we say that the query and the AST match, the optimizer may choose to rewrite the query so that it will access the AST instead of one or more of the base tables, paragraph 0043, lines 3-12, Zaharioudakis);

executing the optimal query execution plan for the query in order to access the data stored on the data store connected to a computer and then output the accessed data. (i.e., the execution of the SQL against the relational database and the ouput of the result set,

page 16, lines 15-18, Provisional application) or (executed steps 316, 0041 and 0043, Zaharioudakis).

generating cardinality estimates (the optimizer may choose to rewrite the query so that it will access the AST instead of one or more of the base tables, the optimizer will rewrite the query if the estimated cost of the rewritten query is less than the original query, 0043, Zaharioudakis or the query can be optimized by re-writing it to use the AST shown fig. 6 using optimizing method determining whether the query should be rewritten to take advantage of one or more of the summary tables, page 16, lines 17) for one or more query execution plans for the query using statistics of one or more pre-defined queries (system held statistics on the data to be accessed as the size of the table, the number of distinct values in particular column, page 9, lines 20-24 of provisional application or 0031, Zaharioudakis) that vertically overlap the query (matching between query and AST, the query can be optimized by re-writing it to use the AST, page 15, lines 14 to page 16, lines 17) or (0043, Zaharioudakis);

using the generated cardinality estimates to determine an optimal query execution plan for the query (matching between query and AST, the query can be optimized by re-writing it to use the AST, page 15, lines 14 to page 16, lines 17, provisional application) or (0043, Zaharioudakis);

executing the optimal query execution plan for the query in order to access the data stored on the data store connected to a computer and then output the accessed data (i.e., the execution of the SQL against the relational database and the output of the

result set, page 16, lines 15-18, Provisional application) or (executed steps 316, 0041 and 0043, Zaharioudakis).

The statistics are used to improve a combined selectivity estimate of one or more predicates of the query (system held statistics on the data to be access as the size of the table, the number of distinct values in particular column, page 9, lines 20-24 of provisional application or 0041, Zaharioudakis and query matching between query and AST, the query can be optimized by re-writing it to use the AST, page 15, lines 14 to page 16, lines 17) or ( 0043, Zaharioudakis).

Bello teaches: wherein the selectivity estimate comprises a ratio of a cardinality of the pre-defined query to a product of cardinalities of base tables referenced in the pre- defined query and the query (i.e., the query reduction factor for a materialized view is the ratio of (1) the sum of the cardinalities of matching relations in the query that will be replaced by the materialized view to (2) the cardinality of the materialized view, col. 10, lines 45-67, Bello and the materialized vies has base tables A, B and C (col. 10, lines 11-12, Bello). Thus, at the time invention was made, it would have been obvious to a person of ordinary skill in the art to include the selectivity estimate comprises a ratio of a cardinality of the pre-defined query to a product of cardinalities of base tables referenced in the pre- defined query and the query in the system of Zaharioudakis as taught by Bello. The motivation being to enable the query reduction factor to estimates how useful it will be to access the materialized view to process the received query (col. 10, lines 42-45, Bello).

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Bello teaches: wherein zero or more predicates of the query are applied by one of the pre-defined queries and wherein the remaining predicates are eligible to be applied on the pre-defined query (i.e., a query contain A, B, C , D and a materialized view definition contains the join A, B, E, under these conditions, the join A, B is the common section, the joins B, C and C, D belong the query delta, and the join B, E belongs to the materialized view delta, (col. 8, lines 62-67) and (col. 10, lines 20-45, Bello). Thus, at the time invention was made, it would have been obvious to a person of ordinary skill in the art to include the remaining predicates are eligible to be applied on the automatic summary table in the system of Bello as taught by Bello. The motivation being to enable the system determines whether the materialized view is actually eligible to be used in rewrite of the received query to reduce the execution cost of the query. Thus, at the time invention was made, it would have been obvious to a person of ordinary skill in the art to include wherein zero or more predicates of the query are applied by one of the pre-defined queries and wherein the remaining predicates are

eligible to be applied on the pre-defined query in the system of Zaharioudakis as taught by Bello. The motivation being to enable the system determines whether the materialized view is actually eligible to be used in rewrite of the received query to reduce the execution cost of the query.

Bello teaches: further comprising determining a subpredicate combined selectivity estimate of the unapplied eligible predicates using column distribution statistics of the pre-defined query (i.e., the actual sum of sales for stores 1, 2 and 3 are \$12, \$18 and \$12 , respectively, however, the values in the sumsales column of summary table 904 for stores 1, 2 and 30 are \$24., 54 and 12, (col. 19, lines 40-55, Bello).

Bello teaches: wherein a cardinality ratio comprises a ratio of a cardinality of the pre-defined query to a product of cardinalities of base tables referenced in the pre-defined query and the query (i.e., the query reduction factor for a materialized view is the ratio of (1) the sum of the cardinalities of matching relations in the query that will be replaced by the materialized view to (2) the cardinality of the materialized view, col. 10, lines 45-67, Bello and the materialized view has base tables A, B and C (col. 10, lines 11-12, Bello).

Bello teaches: wherein the selectivity estimate comprises a product of the subpredicate combined selectivity estimate and the cardinality ratio (i.e., the query reduction factor for a materialized view is the ratio of (1) the sum of the cardinalities of matching relations in the query that will be replaced by the materialized view to (2) the cardinality of the materialized view,

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col. 10, lines 45-67, Bello and the materialized vies has base tables A, B and C (col. 10, lines 11-12, Bello).

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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Conferees:

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